

# IRFB17N60K

## SMPS MOSFET

HEXFET® Power MOSFET

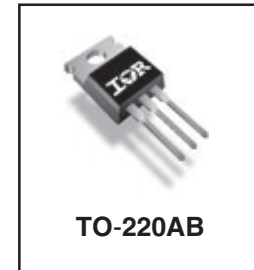
### Applications

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply
- High Speed Power Switching
- Hard Switched and High Frequency Circuits

$V_{DSS}$	$R_{DS(on)}$ typ.	$I_D$
600V	0.35Ω	17A

### Benefits

- Smaller TO-220 Package
- Low Gate Charge  $Q_g$  results in Simple Drive Requirement
- Improved Gate, Avalanche and Dynamic  $dv/dt$  Ruggedness
- Fully Characterized Capacitance and Avalanche Voltage and Current



### Absolute Maximum Ratings

	Parameter	Max.	Units
$I_D$ @ $T_C = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V	17	A
$I_D$ @ $T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V	11	
$I_{DM}$	Pulsed Drain Current ①	68	
$P_D$ @ $T_C = 25^\circ\text{C}$	Power Dissipation	340	W
	Linear Derating Factor	2.7	W/°C
$V_{GS}$	Gate-to-Source Voltage	± 30	V
$dv/dt$	Peak Diode Recovery $dv/dt$ ③	11	V/ns
$T_J$	Operating Junction and	-55 to + 150	
$T_{STG}$	Storage Temperature Range		
	Soldering Temperature, for 10 seconds (1.6mm from case )	300	°C
	Mounting Torque, 6-32 or M3 screw	10	N

### Avalanche Characteristics

Symbol	Parameter	Typ.	Max.	Units
$E_{AS}$	Single Pulse Avalanche Energy②	—	330	mJ
$I_{AR}$	Avalanche Current①	—	17	A
$E_{AR}$	Repetitive Avalanche Energy①	—	34	mJ

### Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	0.37	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient	—	58	

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International  
IR Rectifier

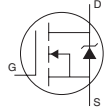
## Static @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	600	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.60	—	V/°C	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	0.35	0.42	$\Omega$	$V_{GS} = 10V, I_D = 10A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	3.0	—	5.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	50	$\mu A$	$V_{DS} = 600V, V_{GS} = 0V$
		—	—	250	$\mu A$	$V_{DS} = 480V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 30V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -30V$

## Dynamic @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$g_{fs}$	Forward Transconductance	5.9	—	—	S	$V_{DS} = 50V, I_D = 10A$
$Q_g$	Total Gate Charge	—	—	99	nC	$I_D = 17A$
$Q_{gs}$	Gate-to-Source Charge	—	—	32		$V_{DS} = 480V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	—	47		$V_{GS} = 10V, \text{See Fig. 6 and 13 } \textcircled{4}$
$t_{d(on)}$	Turn-On Delay Time	—	25	—	ns	$V_{DD} = 300V$
$t_r$	Rise Time	—	82	—		$I_D = 17A$
$t_{d(off)}$	Turn-Off Delay Time	—	38	—		$R_G = 7.5\Omega$
$t_f$	Fall Time	—	32	—		$V_{GS} = 10V, \text{See Fig. 10 } \textcircled{4}$
$C_{iss}$	Input Capacitance	—	2700	—		$V_{GS} = 0V$
$C_{oss}$	Output Capacitance	—	240	—	pF	$V_{DS} = 25V$
$C_{rss}$	Reverse Transfer Capacitance	—	21	—		$f = 1.0\text{MHz}, \text{See Fig. 5}$
$C_{oss}$	Output Capacitance	—	2950	—		$V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0\text{MHz}$
$C_{oss}$	Output Capacitance	—	67	—		$V_{GS} = 0V, V_{DS} = 480V, f = 1.0\text{MHz}$
$C_{oss \text{ eff.}}$	Effective Output Capacitance	—	120	—		$V_{GS} = 0V, V_{DS} = 0V \text{ to } 480V \textcircled{5}$

## Diode Characteristics

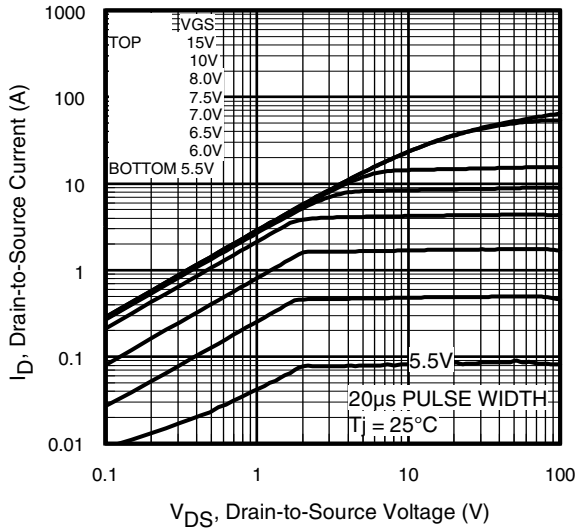
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	17	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	68		
$V_{SD}$	Diode Forward Voltage	—	—	1.5	V	$T_J = 25^\circ\text{C}, I_S = 17A, V_{GS} = 0V$ ④
$t_{rr}$	Reverse Recovery Time	—	520	780	ns	$T_J = 25^\circ\text{C}, I_F = 17A$
$Q_{rr}$	Reverse Recovery Charge	—	5620	8430	nC	$di/dt = 100A/\mu s$ ④
$t_{rr}$	Reverse Recovery Time	—	580	870	ns	$T_J = 125^\circ\text{C}, I_F = 17A$
$Q_{rr}$	Reverse Recovery Charge	—	6470	9700	nC	$di/dt = 100A/\mu s$ ④
$t_{on}$	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by $L_S + L_D$ )				

### Notes:

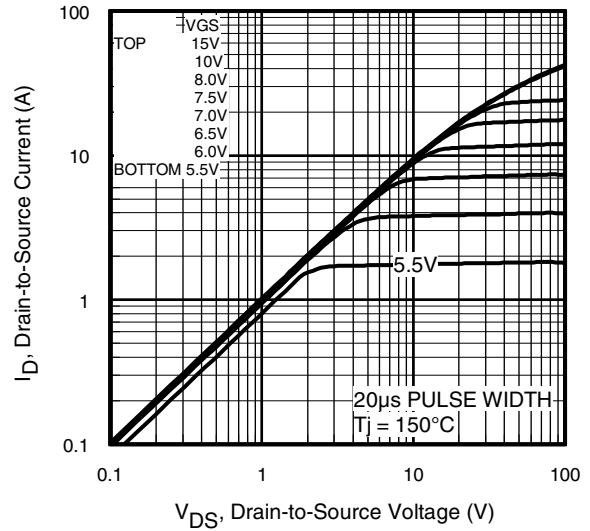
- ① Repetitive rating; pulse width limited by max. junction temperature.  
② Starting  $T_J = 25^\circ\text{C}$ ,  $L = 2.3\text{mH}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 17A$ ,

- ③  $I_{SD} \leq 17A$ ,  $di/dt \leq 380A/\mu s$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 150^\circ\text{C}$

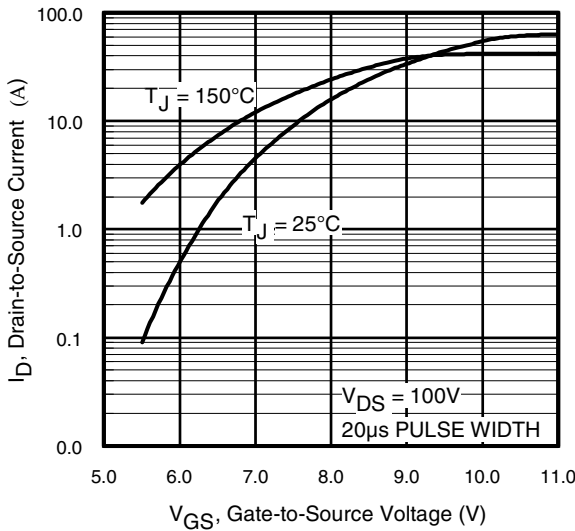
- ④ Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .



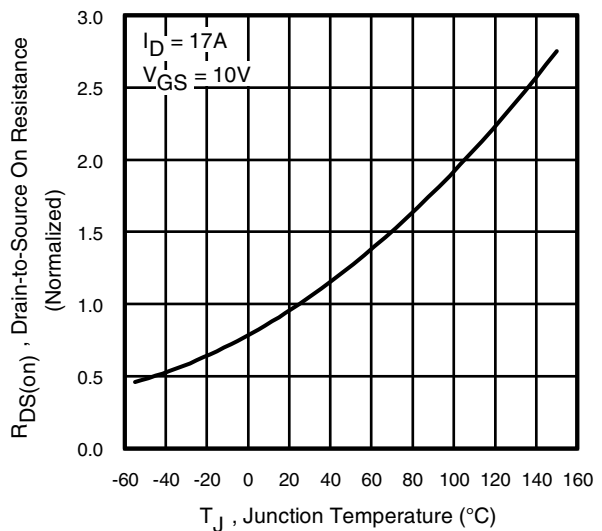
**Fig 1.** Typical Output Characteristics



**Fig 2.** Typical Output Characteristics

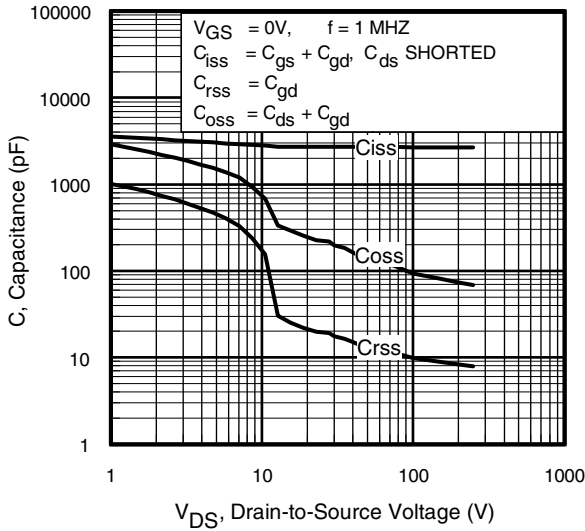


**Fig 3.** Typical Transfer Characteristics

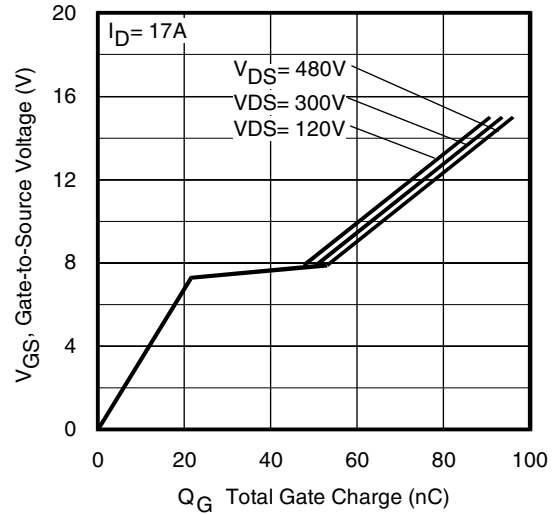


**Fig 4.** Normalized On-Resistance Vs. Temperature

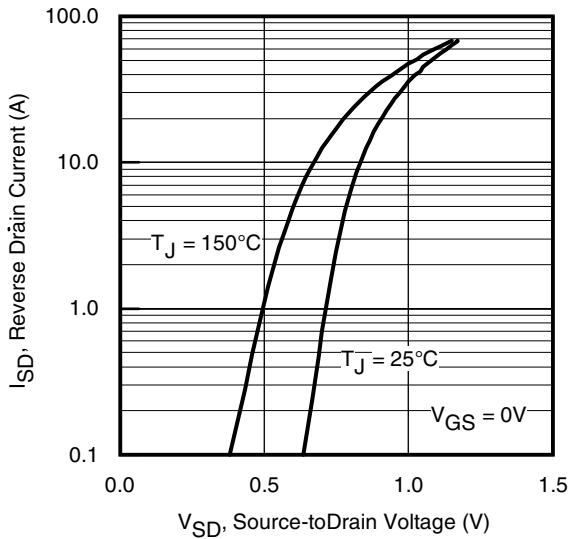
# IRFB17N60K



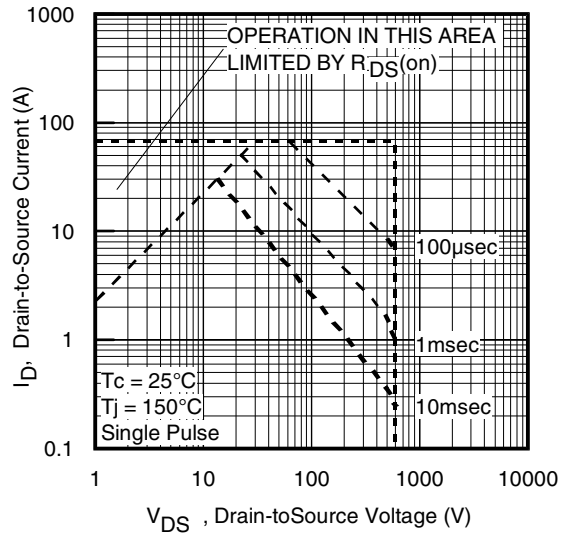
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



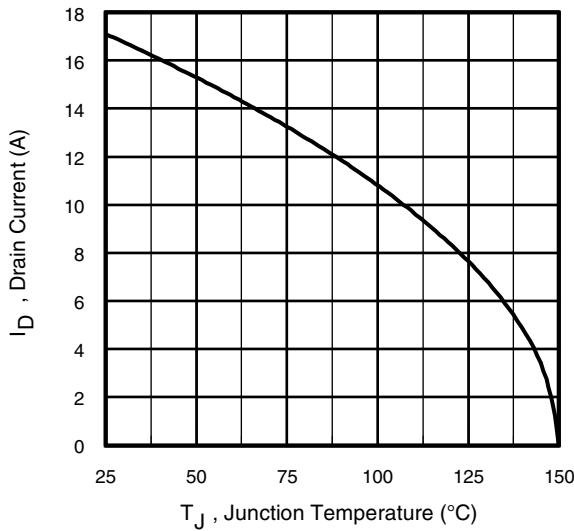
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



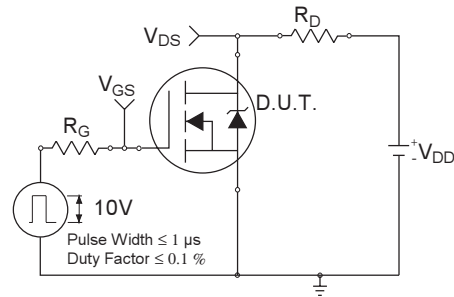
**Fig 7.** Typical Source-Drain Diode Forward Voltage



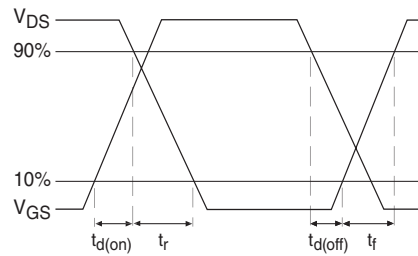
**Fig 8.** Maximum Safe Operating Area



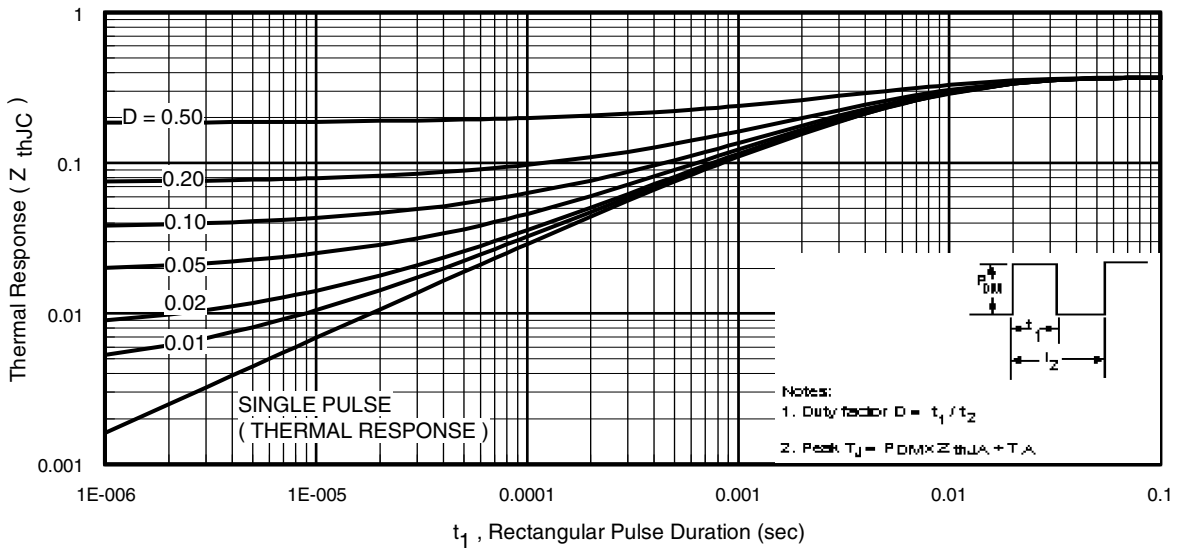
**Fig 9.** Maximum Drain Current Vs. Case Temperature



**Fig 10a.** Switching Time Test Circuit

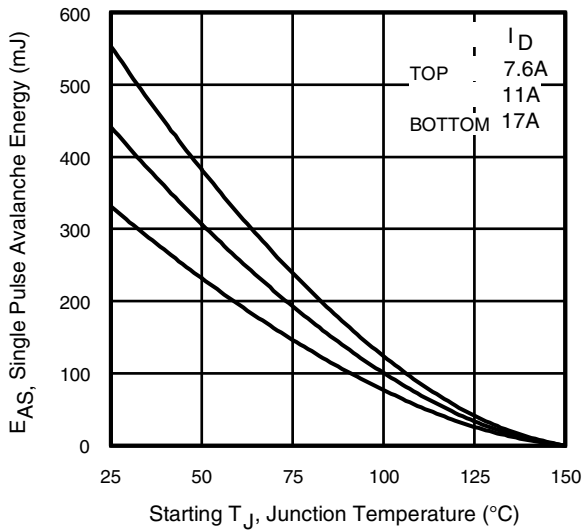


**Fig 10b.** Switching Time Waveforms

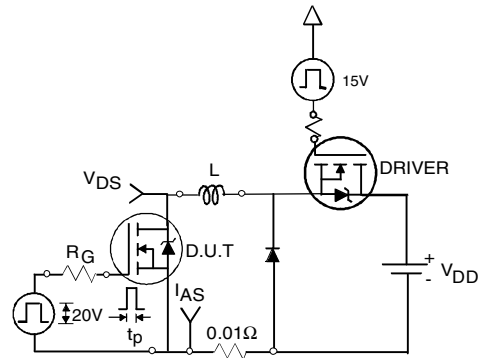


**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Case

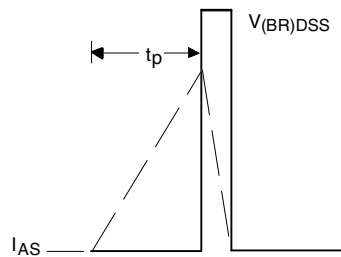
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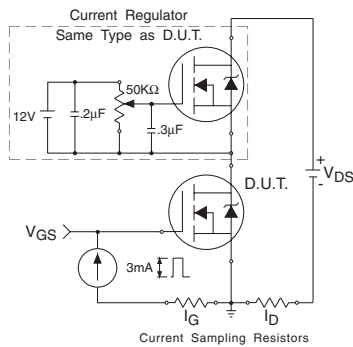
**Fig 12a.** Maximum Avalanche Energy Vs. Drain Current



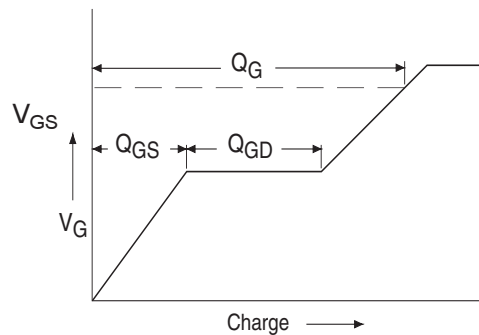
**Fig 12c.** Unclamped Inductive Test Circuit



**Fig 12d.** Unclamped Inductive Waveforms

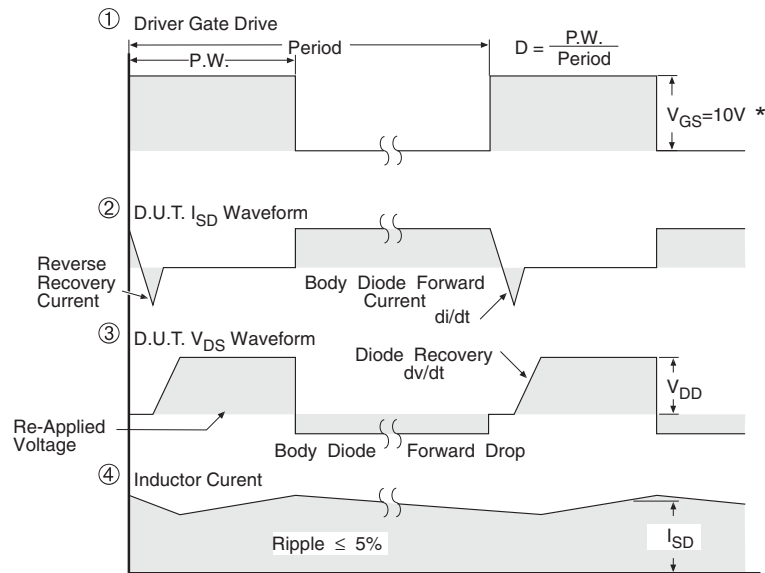
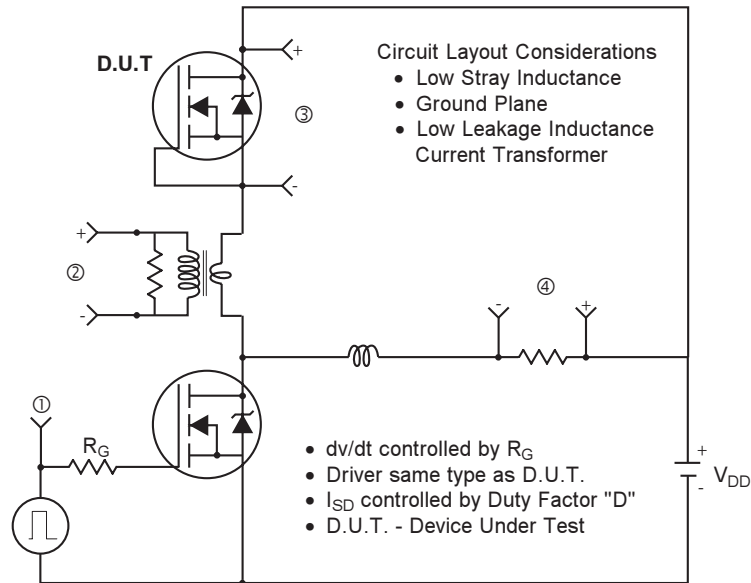


**Fig 13a.** Gate Charge Test Circuit



**Fig 13b.** Basic Gate Charge Waveform

## Peak Diode Recovery dv/dt Test Circuit



\*  $V_{GS} = 5V$  for Logic Level Devices

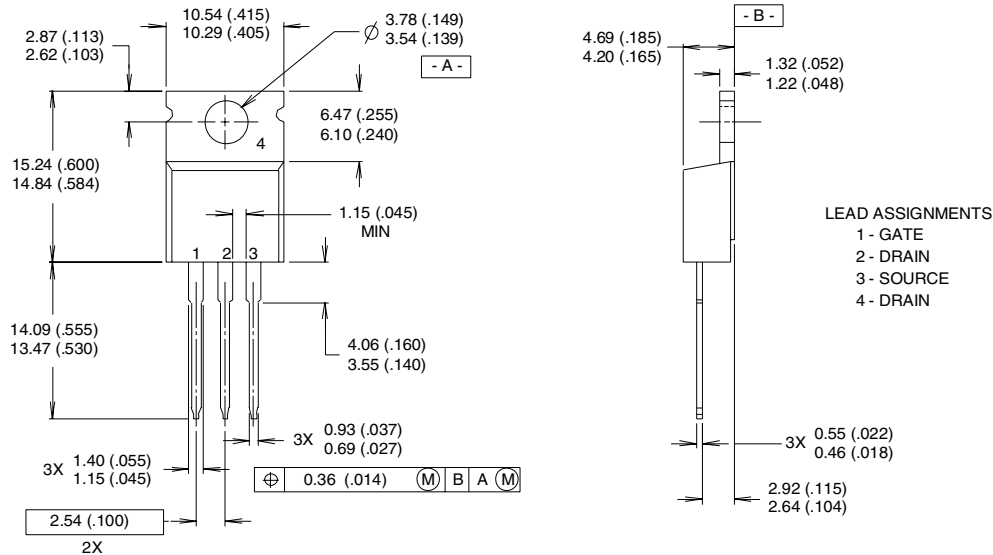
**Fig 14.** For N-Channel HEXFET® Power MOSFETs

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International  
**IR** Rectifier

## TO-220AB Package Outline

Dimensions are shown in millimeters (inches)

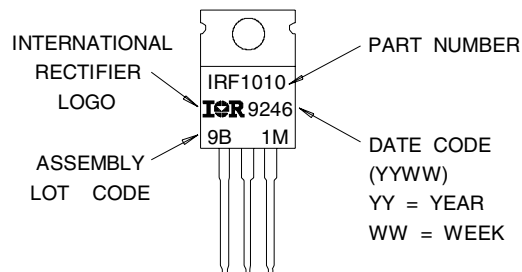


**NOTES:**

- 1 DIMENSIONING & TOLERANCING PER ANSI Y14.5M, 1982.
- 2 CONTROLLING DIMENSION : INCH
- 3 OUTLINE CONFORMS TO JEDEC OUTLINE TO-220AB.
- 4 HEATSINK & LEAD MEASUREMENTS DO NOT INCLUDE BURRS.

## TO-220AB Part Marking Information

EXAMPLE : THIS IS AN IRF1010  
 WITH ASSEMBLY  
 LOT CODE 9B1M



TO-220AB package is not recommended for Surface Mount Application

Data and specifications subject to change without notice.  
 This product has been designed and qualified for the Automotive [Q101] market.  
 Qualification Standards can be found on IR's Web site.

International  
**IR** Rectifier

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